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RESEARCH CONCERNING CHEMICAL CONTROL OF THE INVASIVE SPECIES *AMBROSIA ARTEMISIIFOLIA L.*

CARMINA-ANA NEDELCU, LAUER K.F.

Banat's University of Agricultural Sciences and Veterinary Medicine,
Calea Aradului 119, Timişoara, Romania
ella_nikys@yahoo.com

ABSTRACT - Research concerning chemical control of the invasive species *Ambrosia artemiisfolia L.*
Ambrosia artemsiifolia L., is a yearly monoecious plant, 2n=36, adventive plant is described as a xerofites with an epecofitus character, with antopohorus and anemohorus dissemination, that is multiplied by seeds, is very allergenic and represents a great problem for the sensitive population of the Earth. It is spotted as present in Romania since 1908-1910, it is an invasive plant included in the Official List of Quarantine Weed. Their presence causes great losses in crop production. Ambrosia, shows a great genetic plasticity and is a pioneer plant. It begins to occupy more ground in recent years mainly in southern and southeastern Europe but also in countries with cold climates where ambrosia number of strains began to grow. Its presence in cultures causes many losses in crop production: at potatoes production is 30%, at beet is 70% and at sunflower production due to a great infestation between 23.6-62.4 weeds/m² determines losses between 650-1680 kg. This report presents the chemical control method of this species.

Keywords: *Ambrosia artemisiifolia L.*, allergenic, ecological plasticity, determines great losses in crop production, presence in Romania since 1908-1910.

INTRODUCTION

Ambrosia artemsiifolia L., is a *Compositae* plant that is multiplied by seeds, invasive, planted annually, of late germination, which can reach heights up to 2 m, varies depending on the soil characteristics. It is spotted as present in Romania since 1908-1910. It is an invasive plant included in the Official List of Quarantine Weed.

The quality of weed quarantine has been attributed to it thanks to the fact that it became the main source of allergies in Europe. The harmfulness of this species is caused by allergic diseases caused by the bloom period, due to the large amount of pollen emitted into the atmosphere. This ecophysiological germinating behavior and its characteristic make it a successful pioneer species. *Ambrosia Artemissiifolia L.* is a yearly monoecious plant, 2n=36. The adventive plant is described as a xerofites with an epecofitus character, with antopohorus and anemohorus dissemination. Ambrosia is developed through seeds, being a yearly plant, monoecious (on the sme individual there are both female and male flowers) and can attain (BASSET & CROMPTON, 1975) 2 m in altitude.

Ambrosia Artemisiifolia L. is considered a weed of spring crops, like the sunflower, but it also invades large areas such as open fields or river banks (BASSET AND CROMPTON, 1975). Ambrosia artemisiifolia is a quarantine plant with luxuriant growth (ANGHEL, 1972). Ecological research in the U.S.A. describe the fact that *Ambrosia artemisiifolia* proves a particular genetic plasticity and it is a successful pioneer-plant in open areas (BAZZAZ, 1974; RAYNAL AND BAZZAZ, 1975).

The first information on the presence of this species in Romania, dates since 1908-1910, when the plant was sporadically present throughout the country, in the area of Cluj. On the rocks in Sodorat and in the Somes plain, in the Banat area at Orşova. After 1990 they moved to massive deforestation, increased the number of abandoned fields and weed control was not done any longer.

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Ambrosia artemisiifolia L., produces damage in agriculture: 30% at potatoes, 70% at beet, at sunflowers an outstanding fact is a high degree of infestation, between 23.6 to 62.4 plants/m² determine a large lead of between 650-1680 kg. Up until now all the researches made on ambrosia have highlighted the fact that the infestations in corn crops have brought great losses in production. Chemical control of *Ambrosia artemisiifolia L.* was done by Romanian researchers, such as HODIŞAN N. (2006) and HODISAN et al., (2007) as well as by foreign reseachers, such as COMTOIS P., (2007) and SERGEY YA, (2007) with herbicides with a base of Flurasulam, Prosulfuron, Oxadiargil, Metribuzin, Bifenox, Clopiralid.

MATERIAL AND METHOD

The work presents the method of chemical control of this species. Experiences based on the chemical control of the species *Ambrosia artemisiifolia L.* were made entirely in 2009-2010 on land belonging to Teaching and Experimental Station of Timisoara, operating legally under the patronage of the University of Agricultural Sciences and Veterinary Medicine of Banat. The experience field was done after the randomized blocks method, with four variants in three repetitions. The treatments were applied in 3 phenological phases of corn growth as follows: 13–14 BBCH, 15–16 BBCH and 18–20 BBCH, phenological phases that cover well the periods of growth and development of corn plants.

The soil was found gleic decarbonatat vertisol weak, the river deposits fine/medium-fine/medium, medium loamy clay/clay clayey. Young Naturalists Station Timisoara, in terms of geomorphological forms is part of the great physical and geographical unit of Plain Banato-Crişana (after BERINDE AND NEDELCU, 1983).

The Banat plain, is generally uniform at origins, it was later divided, when, after the withdrawal waters of Lake Pannonian, the orogenetice post-vlach movements of the early Holocene, led a last dip in the lower local basin Bega-Timiş. Herbicides of the species *Ambrosia artemisiifolia L.*,was performed during the spring.

This experience was performed by randomized block method in three repetitions, with an area of 7 m² plots.

To combat *Ambrosia artemisiifolia* following herbicides were used:

1. S.D.M.A conţeins - Dimethyl amine salt 600g/ l 2,4-D acid 824 g / l) ;
2. Trophy containes - Acetoclor 762 g/l + Diclormid 128 g/l ;
3. Triftim containes - 480g/l Trifluralin ;
4. Guardian containes - conteins 820-860 g/ l 2 chloro antidote acetoclor + N (etoximtil)-N-(2-ethyl - 6-methyl phenyl) acetamid.

The treatments were applied in 3 feno phases of corn growth as follows: 13 – 14 BBCH, 15 – 16 BBCH and 18–20 BBCH, phenological phases that cover well the periods of growth and development of corn plants. The four tested herbicides on corn crops have had a different efficiency in controlling *Ambrosia artemisiifolia L.*, the S.D.M.A herbicide was superior to the rest of the herbicides. The herbicides were applied preemergent to achieve better control of the species as *Ambrosia artemisiifolia L.*

After applying herbicides have commented on their effectiveness in combating *Ambrosia artemisiifolia L.* At 35 days after herbicides were harvester Ambrosia plants at a height of 5-6 cm, to see if there was the phenomenon of regeneration.

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Table 1: Detailing experience

Herbicides	Age of application of treatments	Dose
Dimethyl amine salt 600g / l 2,4-D acid 824 g / l – R1	Age 3-4 leaves (B1)	1L
	Age 5-6 leaves (B2)	
	Age 8-10 leaves (B3)	
Acetoclor 762 g/l + Diclormid 128 g/l – R2	Age 3-4 leaves (B1)	2L
	Age 5-6 leaves (B2)	
	Age 8-10 leaves (B3)	
Trifluralin 480 g/l – R3	Age 3-4 leaves (B1)	1L
	Age 5-6 leaves (B2)	
	Age 8-10 leaves (B3)	
820-860 g / l 2 chloro antidote acetoclor + N (etoximtil)-N-(2-ethyl - 6-methyl phenyl) acetamid - R4	Age 3-4 leaves (B1)	1,75L
	Age 5-6 leaves (B2)	
	Age 8-10 leaves (B3)	

RESULTS

The four tested herbicides on corn crops have had a different efficiency in controlling *Ambrosia artemisiifolia L.;* the S.D.M.A combat *Ambrosia artemisiifolia L.* the most effective being on first place in the hierarchy; Trophy ranks second in combating this weed and the last place is occupied of Triftim and Guardian with a small degree of control.

Table 2 shows the degree of regeneration of *Ambrosia artemisiifolia L.* based on the herbicide in the ages 3-4, 5-6 and 8-10.

Analyzing the results shown in Table 2 shows that the phenomenon of the *Ambrosia artemisiifolia* regeneration depended heavily on the active substance of each herbicide, the applied dose per hectare and the time of application. The most effective herbicide proved to be S.D.M.A, the most effective of the four herbicides applied in the chemical combat of *Ambrosia artemisiifolia.* It was noted that the effectiveness of this herbicide was constant in all ages.

Thus, the dose recommended by the company producing the phenomenon of regeneration in ages 2-4, 4-6 and 8-10 was 43%, 47% and 54%. It results that at the applied dose (1 l) the degree of control was 51.72%. In the second place lies Trophy herbicide, not much lower than SDMA herbicide, observing that at the applied dose (2 l), the degree of control was 43.74%. From the data presented in Table 2 results that at the recommended dose, the degree of *Ambrosia artemisiifolia L.* regeneration was in all of the 3 ages approx. 48% in S.D.M.A herbicide. The Trophy herbicide had a lower efficacy than S.D.M.A herbicide.

The degree of *Ambrosia artemisiifolia L.* regeneration treated with Trophy was 43% in age 3-4, in age 5-6 was 57% and 66% in the age 8-10, at the recommended dose. It results that the degree of Ambrosia regeneration was approximately 56%. In the 3rd place lies Triftim herbicide with a much lower efficacy than S.D.M.A.

The degree of *Ambrosia artemisiifolia L.* regeneration was 66% in the age of 3-4, 74% in the age of 5-6 and 80% in the age of 8-10 resulting that the degree of *Ambrosia artemisiifolia L.* regeneration was about 73%, resulting a degree of control of 26.50%. In the last place lies Guardian herbicide with a very low level of control of 8.29% compared with S.D.M.A herbicide. The degree of *Ambrosia artemisiifolia L.* regeneration after treatment with herbicide Guardian was in the 3 periods: 3-4, 5-6 and 8-10 87%, 92% and 96%, resulting a degree of regeneration of 91%. The data presented in Table 2, shows that Triftim and Guardian herbicides had the lowest level of combat, the degree of *Ambrosia artemisiifolia L.* regeneration treated with these herbicides was about 73% and 91% higher than SDMA and Trophy herbicides.

Table 2: The degree of *Ambrosia artemisiifolia L.* regeneration treated with different herbicides

Nr. crt.	Herbicides	Time of application	Dose (l/ha)	Degree of regeneration (%)
1.	Marker (neprasit)	-	-	100
2.	Marker (3 prasile)	-	-	15
3.	Dimethyl amine salt 600g / l 2,4-D acid 824 g / l	3-4	1l	43
		5-6	1l	47
		8-10	1l	54
4.	Acetoclor 762 g/l + Diclormid 128 g/l	3-4	2l	45
		5-6	2l	57
		8-10	2l	66
5.	Trifluralin 480 g/l	3-4	1l	66
		5-6	1l	74
		8-10	1l	80
6.	820-860 g / l 2 chloro antidote acetoclor + N (etoximtil)-N-(2-ethyl - 6-methyl phenyl) acetamid	3-4	1,75l	87
		5-6	1,75l	92
		8-10	1,75l	96

Table 3: The significance of the differences between the herbicides studied in terms of the control degree in Ambrosia artemisiifolia L. for the age 3-4 leaves (30 days)

Nr. ctr	Herbicide	Age of application	Chimical control at the age of 2-4 leaf (30 days)			Media (%)	Relative value compared to the control	The difference relative to the control	**Absolute difference. Signific.**
			Rep I	Rep II	Rep III	$\bar{x} \pm s_{\bar{x}}$			
1.	Marker	3-4	0	0	0	0	0	0	**0**
2.	S.D.M.A	3- 4	57,58	57,04	56,28	56,97±0,38	89,00	-11,00	**-7,04*****
3.	Trophy	3- 4	56,25	55,65	53,51	55,14±0,83	86,14	-13,86	**-8,87**^{000}
4.	Triftim	3- 4	34,76	33,18	32,10	33,35±0,77	52,10	-47,90	**-30,66**
5.	Guardian	3-4	10,64	13,36	14,89	12,96±1,24	20,25	-79,75	**-51,05**^{000}

In the age of 3-4 leaves, at 30 days after the herbicide, herbicides SDMA (89.00%) and Trophy (86.14%) proved to be superior in combat *Ambrosia artemisiifolia.* In the next place came herbicide Triftim (52.10%). The last and the least was the herbicide Guardian (20.25%) with a lower chemical control on the species.

Table 4: The significance of the differences between the herbicides studied in terms of the control degree in *Ambrosia artemisiifolia L.* for the age 5-6 leaves (30 days).

Nr. ctr	Herbicide	Age of application	Chemical control at the age of 5-6 leaf (30 days)			Media (%)	Relative value compared to the control	The difference relative to the control	Absolute difference. Signific.
			Rep I	Rep II	Rep III	$\bar{x} \pm s_{\bar{x}}$			
1.	Marker	5 - 6	0	0	0	0	0	0	0
2.	S.D.M.A	5 - 6	53,61	53,19	51,30	52,70±0,71	89,29	-10,71	-6,32^{000}
3.	Trophy	5 - 6	42,65	43,12	42,18	42,65±0,27	72,26	-27,74	-16,37^{000}
4.	Triftim	5 - 6	27,63	28,44	22,16	26,08±1,97	44,18	-55,82	-32,95^{000}
5.	Guardian	5 - 6	8,52	7,98	8,33	8,28±0,16	14,02	-85,98	-50,75^{000}

In the 5-6 leaf stage the percentage of chemical control on *Ambrosii artemisiifolia* it was lower than the other two epochs. The most effective herbicides are SDMA (89.29%) and Trophy (77.26%), followed by herbicide Triftim a percentage of 44.18% for the control and herbicide Guardian with 14.02%. However, during this period results in terms of combating chemical species are relativity good.

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Table 5: The significance of the differences between the herbicides studied in terms of the control degree in *Ambrosia artemisiifolia L.* for the age 8-10 leaves (30 days).

Nr. ctr	Herbicide	Age of application	Chemical control at the age of 8-10 leaf (30 days)			Media (%) $\bar{x} \pm s_{\bar{x}}$	Relative value compared to the control	The difference relative to the control	Absolute difference. Signific.
			Rep I	Rep II	Rep III				
1.	Marker	8 -10	0	0	0	0	0	0	0
2.	S.D.M.A	8-10	44,36	45,64	46,52	45,51±0,63	84,81	-15,19	-8,15000
3.	Trophy	8-10	21,71	20,31	18,25	20,09±1,00	37,44	-62,56	-33,56000
4.	Triftim	8-10	3,64	3,12	4,14	3,63±0,29	6,77	-93,23	-50,02000
5.	Guardian	8-10	33,68	34,52	32,14	33,45±0,70	6,34	-37,66	-20,21000

In the 8-10 leaf stage the percentage of chemical control on *Ambrosii artemisiifolia* it was lower than the other two epochs. The most effective herbicides are SDMA (84.81%) and Trophy (37.44%), followed by herbicide Triftim a percentage of 6.77% for the control and herbicide Guardian with 6.34%. During this period results in terms of combating chemical species are low except S.D.M.A herbicide.

CONCLUSIONS

1. The four herbicides tested in the corn production had a different efficacy in *Ambrosia artemisiifolia L.* control; S.D.M.A and Trophy herbicides were similar in efficacy and also far superior to Guardian and Triftim herbicides.
2. The degree of *Ambrosia artemisiifolia L.* regeneration had depended heavily on the era of the application and on the time. For example, the S.D.M.A herbicide applied in the age of 3-4 leaves had a degree of regeneration of 43% compared to age of 5-6 leaves when the degree of regeneration was 47%.
3. Triftim and Guardian herbicide had the highest degree of regeneration: Triftim with 66% degree of regeneration at the age 3-4 leaves and 74% at the age 5-6 leaves; Guardian with 87% degree of regeneration at the 3-4 leaves and 92% at the stage 5-6 leaves.
4. Also the control degree of *Ambrosia artemisiifolia L.* was inversely proportional with the regeneration degree. For example the control degree of S.D.M.A herbicide was 51.72% with a recovery of about 48% compared with herbicide Trophy in which the control degree was lower - 43.74% but with a visible greater regeneration about 56%.
5. The corn productions were in perfect correlation with the degree of *Ambrosia artemisiifolia L.* regeneration.
6. The control of *Ambrosia artemisiifolia L.* species with herbicides is the most efficient in vegetation phase 3-4 leaves.
7. To obtain satisfying results regarding the control of *Ambrosia artemisiifolia L.* in cultivated crops, due to plants capacity to regenerate, it is necessary that besides herbicides treatments, to be applied mechanical methods of control.
8. The best results in controlling this species was obtained with S.D.M.A herbicide in all 3 phases: 3-4 leaves, 5-6 leaves, 8-10 leaves who caused the necrosis of the weed.

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